
Project Title: **Development of Gentle Intervention Processes to Enhance the Safety of Heat Sensitive Foods**

Lead Scientist: **ARS Scientist**

National Program: **108 Food Safety-Postharvest**

Reviewer Number: **NNCK1120**

- 2. Adequacy of Approach and Procedures:** Are the hypotheses and/or plan of work well conceived? Are the experiments, analytical methods, and approaches and procedures appropriate and sufficient to accomplish the objectives? How could the approach or research procedures be improved?

Comments:

1. The hypothesis that... condensing steam will inactivate bacteria on the surface of solid foods without causing thermal damage if the interfering air and water layers on the surface are removed by vacuum and the condensed steam is removed to evaporatively cool the surface... is scientifically sound and workable. Indeed, the group has developed and tested the technology with a pilot plant prototype and chicken pieces, which indicated a 2 log reduction of LM in initial studies. Further refinement will involve retrofitting the prototype to treat the whole carcass (surface, visceral cavity) and development of a field VSV pasteurization system. Additional studies will focus on ready-to-eat meats, specifically hot dogs (and the known LM hazard) and catfish, with both aspects under appropriate CRADAs. The former is a high priority research need for food safety regulatory agencies, and the contingency inactivation studies "in-package" (within plastic) should probably be elevated to practice in the proposal. The portion of the proposal indicating the development of models and process simulations, towards determining the mechanism of VSV inactivation, is appropriate, but of lower priority in the overall project schema. Any modeling aspect should be focused on process delivery and eventual development and validation of performance standards to support food safety.
1. The controversial theory that "pasteurization" of heat-sensitive foods is accomplished by applied voltage or magnetic field and, perhaps, can be demonstrated with the incumbents' "uniquely modified RF heater" is the overall working hypothesis for this objective. This entire objective is very high risk, but the payoff is potentially high. The proposal articulates a clear, stepwise protocol. The modified RF "heater" appears to be designed to offset the often-stated criticism towards the non-thermal theories that precise measurements of the time-"temperature" history and its spatial variations are lacking.

Recommendations:

1. Objective 1 - The proposal needs to incorporate a more specific explanation of the steps needed to determine the effectiveness of the VSV treatment. Will naturally occurring pathogen populations be known or established?

ARS Response: We added more detail to the plan or work (see Bold text on page 32). Specifically, we will use Null hypothesis to determine statistically significant differences between the treated and control, within 1 day, cross 3 days, over weeks and seasons. Each company will have their own specific tests to run to determine effectiveness.

We will test for *Campylobacter* and generic *E. coli* at Athens. One company has expressed an interest in looking at *Salmonella*. At that plant, they will test for it. It is the objective to develop the process for commercial adoption. We expect individual companies will do more specific tests and share the data. In all cases in which it is feasible, we will try to establish the pathogens present.

state process.

6. Objective 2 - A portion of the research has a focus on mechanisms for inactivation of microbial cells due to electromagnetic energy. These investigations should be expanded to include all forms of electrical energy.

ARS Response: This phase of the research is meant to support the process development through a better understanding of the basic principles involved. There are insufficient funds to look at all forms of electrical energy. We must be selective and choose to investigate the form we consider has the greatest potential for commercialization.